

WHAT IS CLAIMED IS:

1. An apparatus for controlling the temperature of an electronic device, said apparatus comprising:

a thermal head for engaging said electronic device;

said thermal head having an inlet and an outlet defining a flow channel therebetween;

a refrigeration system defining a flow loop operative to circulate refrigerant fluid through said flow channel of said thermal head so as to cause transfer of thermal energy between said electronic device and said thermal head;

a connection mechanism located in said flow loop, said connection mechanism adapted to allow said thermal head to be detached from said refrigeration system;

a first shutoff valve situated in said flow loop between said refrigeration system and said inlet; and

a second shutoff valve situated in said flow loop between said refrigeration system and said outlet.

2. The apparatus as recited in claim 1, further comprising a vacuum pump in fluid communication with said flow loop.

3. The apparatus as recited in claim 2, wherein said vacuum pump is in fluid communication with a branch line tapped into said flow loop at a location between said outlet of said flow channel and said second shutoff valve.

4. The apparatus as recited in claim 3, further comprising a third shutoff valve located along said branch line between said flow loop and said vacuum pump.

5. The apparatus as recited in claim 4, wherein said shutoff valves are electronically controlled valves.

6. The apparatus as recited in claim 1, wherein said connection mechanism comprises a first inlet connector located upstream of said thermal head and a second outlet connector located downstream of said thermal head.

7. The apparatus as recited in claim 6, further comprising a vacuum pump in fluid communication with a branch line tapped into said

flow loop at a location between said outlet of said flow channel and said second outlet connector.

8. The apparatus as recited in claim 1, wherein said first shutoff valve normally functions as a metering valve that regulates flow of said refrigerant fluid into said inlet of said flow channel.

9. The apparatus as recited in claim 8, wherein said second shutoff valve normally functions as a metering valve that regulates flow of said refrigerant fluid flowing from said outlet of said flow channel.

10. The apparatus as recited in claim 1, further comprising control means operative to conserve automatically said refrigerant fluid before said thermal head is disconnected from said flow loop.

11. The apparatus as recited in claim 10, wherein said control means functions to close said first shutoff valve prior to closing said second shutoff valve so that said refrigerant fluid will be conserved by interim operation of said refrigeration system.

12. The apparatus as recited in claim 1, wherein a portion of said flow channel includes open channels formed in said thermal head.

13. An apparatus for controlling the temperature of an electronic device, said apparatus comprising:

a refrigeration system including a compressor and a condenser, said refrigeration system being operative to circulate a refrigerant fluid through a fluid flow loop such that said refrigerant fluid will change between gaseous and liquid states so as to alternately absorb and release thermal energy;

a thermal head having a temperature controlled surface, said thermal head having an inlet and an outlet defining a flow channel therebetween for passage of said refrigerant fluid to thereby function as an evaporator in said refrigeration system;

first and second shutoff valves located in said flow loop between said refrigeration system and said thermal head, said first shutoff valve being upstream of said thermal head and said second shutoff valve being downstream of said thermal head; and

control means operative to sequentially close said first shutoff valve and said second shutoff

valve while continuing to operate said compressor in the interim period of time so as to reclaim said refrigerant fluid.

14. The apparatus as recited in claim 13, further comprising a first inlet connector located in said flow loop between said thermal head and said first shutoff valve and a second outlet connector located in said flow loop between said thermal head and said second shutoff valve.

15. The apparatus as recited in claim 14, further comprising a vacuum pump in fluid communication with said flow loop.

16. The apparatus as recited in claim 15, wherein said vacuum pump is in fluid communication with a branch line tapped into said flow loop at a location between said second shutoff valve and said second outlet connector.

17. The apparatus as recited in claim 16, further comprising a third shutoff valve located along said branch line.

18. The apparatus as recited in claim 15, further comprising a source of dry gas in fluid communication with said flow loop.

19. The apparatus as recited in claim 17, wherein said first and second shutoff valves normally function as metering valves to regulate flow of said refrigerant fluid into and out of said thermal head, respectively.

20. An apparatus comprising:

a refrigeration system including a compressor and a condenser, said refrigeration system being operative to circulate a refrigerant fluid through a fluid flow loop such that said refrigerant fluid will change between gaseous and liquid states so as to alternately absorb and release thermal energy;

a first shutoff valve located in said fluid flow loop at a position downstream of said condenser;

a second shutoff valve located in said fluid flow loop at a position upstream of said compressor;

a first thermal head configured to be detachably connected into said fluid flow loop so as to function as an evaporator in said refrigeration system, said first thermal head having a temperature controlled surface of a first configuration for making thermal contact with a first electronic device; and

a second thermal head configured to be detachably connected into said fluid flow loop so as

to function as an evaporator in said refrigeration system, said second thermal head having a temperature controlled surface of a second configuration for making thermal contact with a second electronic device.

21. A method comprising steps of:

(a) providing a first thermal head for cooling an electronic device, said first thermal head being connected into a fluid flow loop of a refrigeration system;

(b) providing first and second shutoff valves in said fluid flow loop on upstream and downstream sides of said thermal head, respectively;

(c) while operating said refrigeration system, closing said first shutoff valve to prevent further flow of refrigerant fluid into said first thermal head;

(d) continuing to operate said refrigeration system until substantially all of said refrigerant fluid is drawn from said thermal head;

(e) closing said second shutoff valve with said first shutoff valve remaining closed so as to trap substantially all of said refrigerant fluid; and

(f) disconnecting said first thermal head from said refrigeration system.

22. The method as recited in claim 21, further comprising the steps of:

(g) upon completion of step (f), connecting a second thermal head into said fluid flow loop of said refrigeration system;

(h) evacuating air within said second thermal head; and

(i) opening said first and second shutoff valves to allow normal flow of said refrigerant fluid to resume.

23. The method as recited in claim 21, wherein steps (c)-(f) are automatically completed in response to actuation of a user input device.